

Effects of the application of a stern foil on ship resistance: A case study of an orela crew boat

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Abstrak

The effects of the application of a stern hydrofoil on ship resistance were studied numerically using computational fluid dynamics (CFD) and were verified using data from model tests. A 40 m planing-hull Orela crew boat, with target top speed of 28 knots (Froude number, $Fr = 0.73$), was considered. The stern foil (NACA 64(1)212) was installed with the leading edge positioned precisely below the transom with angle of attack of 2 degrees at elevation $0.853 T$ below the water surface (where T is the boat's draft). At relatively low speed ($Fr < \sim 0.45$) the application of a stern foil results in an increase in ship resistance (of up to 13.9%), while at relatively high speed ($Fr > \sim 0.55$) it results in a decrease in ship resistance (of up to 10.0%). As the Froude number increases, the resistance coefficient (CT) first increases, reaches a maximum value, and then decreases. Its maximum value occurs at $Fr \approx 0.5$, which is consistent with the prediction of a resistance barrier at approximately this Froude number.